

## **REMARKS**

This is a full and timely response to the outstanding non-final Office Action mailed July 15, 2009. The Examiner is thanked for the thorough examination of the present application. Upon entry of this response, claims 1, 2, 4, 6-14, 29-42, and 57 are pending in the present application. Claims 1, 29, and 57 have been amended, and claim 14 has been canceled. Applicants respectfully request consideration of the following remarks contained herein. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

### **I. Summary of Telephone Interview with Examiner**

Applicants wish to thank Examiner Odom for the time spent with Applicants' representative Jeffrey Hsu (Registration No. 63,063) during a telephonic interview conducted on October 10, 2009 regarding the above-identified Office Action. While no agreement was reached, Applicants thank Examiner Odom for his comments and suggestions. Applicants submit that the amendments and remarks set forth herein are consistent with those raised during the telephonic interview.

### **II. Response to Claim Rejections Under 35 U.S.C. § 103**

For a proper rejection of the claim under 35 U.S.C. § 103, the cited combination of references must disclose, teach, or suggest all elements / features of the claim at issue. See, e.g., *In re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988) and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981). Claims 1, 2, 4, 6-9, 13, 14, 29-37, 41, 42, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ghosh* (U.S. Patent No. 5,777,692) in view of *Long et al.* (U.S. Patent No. 6,628,704 hereinafter "*Long*"). Claims 10-12 and 38-40 are rejected under 35 U.S.C. 103(a) as

being unpatentable over *Ghosh* in view of *Long* in further view of *Bergmans* (U.S. Patent No. 4,905,254). For at least the reasons set forth below, Applicants traverse the rejections set forth.

**A. Claims 1, 2, 4, 6-9, 13, and 14**

Applicants respectfully submit that independent claim 1 patently defines over *Ghosh* in view of *Long* for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 1.

Claim 1, as amended, recites:

1. A method for reducing interference due to handshake tones in the frequency domain in a communication system, the method comprising the steps of:
  - receiving an input signal  $X_t$  in the frequency domain at bin  $q$  and time-symbol  $t$ , wherein the input signal comprises a short correlation time component and a long correlation time component, wherein the long correlation time component corresponds to a disturbance signal due to handshake tones;
  - attaining near zero correlation for the short correlation time component in the received input signal by delaying the input signal by a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{t-N}$ ;
  - estimating the disturbance signal by generating a prediction signal with long correlation properties based at least in part on the delayed signal;
  - comparing the input signal and the prediction signal; and correlating the received input signal to the disturbance signal by reducing a variance between the received input signal and the prediction signal;
- wherein the steps are performed in a transceiver within the communication system.

(Emphasis added). Claim 1 has been amended to further define certain features.

Applicants respectfully submit that the proposed combination of *Ghosh* and *Long* fails to disclose, teach, or suggest the features emphasized above. While the Office Action acknowledges that *Ghosh* fails to disclose a method for reducing interference due to

handshake tones in a communication system, the Office Action relies on *Ghosh* to allegedly disclose other features above, including the step of receiving an input signal  $X_t$  in the frequency domain at bin  $q$  and time-symbol  $t$  and the step of reducing a variance between the received input signal and the prediction signal. As set forth above, Applicants have amended claim 1 to recite the limitation "wherein the long correlation time component corresponds to a disturbance signal due to handshake tones." Claim 1 now also recites "correlating the received input signal to the disturbance signal by reducing a variance between the received input signal and the prediction signal." As set forth in the specification of the present application, various embodiments are described for leveraging the high correlation time of handshake tone signals. Other forms of noise, such as white noise, are difficult to predict thereby resulting in a low correlation time. In this regard, estimates of the disturbance signal due to handshake tones may be obtained based the assumption that the disturbance signal exhibit long correlation properties.

As set forth in the abstract of the *Ghosh* references, *Ghosh* generally describes "removing co-channel conventional television signal interference from a digital signal by using an-adaptive filter which tunes to the periodic components of the conventional television signal." *Ghosh* further describes that the output of the adaptive filter is subtracted from the received signal to produce an error signal. This error signal is then used to recursively update the taps of the adaptive filter. Turning now to the rejection, for the step of receiving an input signal  $X_t$ , the Office Action refers to the signal depicted in FIG. 5A and to the text in col. 1, lines 10-50. FIG. 5A shows an upstream symbol pattern in a hyperframe without a cyclic prefix inserted. For the long

correlation component in claim 1, the Office Action cites the “transmitted symbol sequence.” (See Office Action, page 3.) It is not clear, however, how *Ghosh* discloses or suggests the limitation, “wherein the long correlation time component corresponds to a disturbance signal due to handshake tones.” Applicants respectfully submit that the *Ghosh* fails to disclose this feature. Moreover, the secondary *Long* reference fails to address this deficiency.

Accordingly, Applicants respectfully submit that independent claim 1 patently defines over *Ghosh* in view of *Long*. Furthermore, Applicants submit that dependent claims 2, 4, 6-9, and 13 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

#### **B. Claims 29-37, 41, and 42**

Applicants respectfully submit that independent claim 29 patently defines over *Ghosh* in view of *Long* for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 29.

Claim 29, as amended, recites:

29. A system for reducing interference due to handshake tones in the frequency domain, the system comprising:

an input for receiving an input signal in the frequency domain having a short correlation time component and a long correlation time component, wherein the long correlation time component corresponds to a disturbance signal due to handshake tones;

a delay module for generating a delayed signal by delaying the input signal by a delay value equal to an upper bound of the short correlation component; and

a filter for generating a prediction signal based at least in part on the delayed signal to estimate the disturbance signal;

wherein the input signal and the prediction signal are

compared and a variance between the input signal and the prediction signal is reduced.

(Emphasis added). Applicants have amended claim 29 to now recite the limitation, "wherein the long correlation time component corresponds to a disturbance signal due to handshake tones." Claim 29 now also recites "a filter for generating a prediction signal based at least in part on the delayed signal to estimate the disturbance signal." As claim 29 recites similar defining features as those in claim 1, Applicants submit that similar arguments apply. As discussed above, various embodiments are described in the specification of the present application for leveraging the high correlation time of handshake tone signals. Other forms of noise, such as white noise, is difficult to predict thereby resulting in a low correlation time. In this regard, estimates of the disturbance signal due to handshake tones may be obtained based the assumption that the disturbance signal exhibit long correlation properties.

As set forth in the abstract of the *Ghosh* references, *Ghosh* generally describes "removing co-channel conventional television signal interference from a digital signal by using an-adaptive filter which tunes to the periodic components of the conventional television signal." *Ghosh* further describes that the output of the adaptive filter is subtracted from the received signal to produce an error signal. This error signal is then used to recursively update the taps of the adaptive filter. FIG. 5A shows an upstream symbol pattern in a hyperframe without a cyclic prefix inserted. For the long correlation component in claim 29, the Office Action again cites the "transmitted symbol sequence." (See Office Action, page 5.) It is not clear, however, how *Ghosh* discloses or suggests the limitation, "wherein the long correlation time component corresponds to a disturbance signal due to handshake tones." Applicants respectfully

submit that the *Ghosh* fails to disclose this feature. Moreover, the secondary *Long* reference fails to address this deficiency.

Accordingly, Applicants respectfully submit that independent claim 29 patently defines over *Ghosh* in view of *Long* for at least the reason that *Ghosh* in view of *Long*. Furthermore, Applicants submit that dependent claims 30-37, 41, and 42 are allowable for at least the reason that these claims depend from an allowable independent claim.

### C. Claim 57

Applicants respectfully submit that independent claim 57 patently defines over *Ghosh* in view of *Long* for at least the reason that the combination fails to disclose, teach, or suggest the features emphasized below in claim 57.

Claim 57 recites:

57. A system for reducing interference due to handshake tones in the time domain, comprising:

means for receiving an input signal in the frequency domain having a short correlation time component and a long correlation time component;

means for generating a delayed signal by delaying the input signal by a delay value, wherein the delay value is equal to a time-symbol value  $N$ , wherein  $N$  is an integer such that the generated delayed signal is  $X_{i,N}$ , wherein  $X_i$  is the input signal at bin  $q$  and time-symbol  $t$ , wherein the value  $N$  is based on an upper bound of the short correlation time component, and wherein the long correlation time component exhibits high correlation beyond the upper bound;

means for generating a prediction signal with a high correlation value based at least in part on the delayed signal;

means for comparing the input signal and the prediction signal; and

means for reducing a variance between the input signal and the prediction signal.

(Emphasis added). Applicants have amended claim 57 to further define the "means for generating a delayed signal." Specifically, claim 57 now recites the limitation,

"wherein the long correlation time component exhibits high correlation beyond the upper bound." Applicants respectfully submit that the proposed combination of *Ghosh* and *Long* fails to disclose or suggest this feature. On page 7, the Office Action relies on *Ghosh* to disclose the "means for generating a delayed signal" of claim 57 and refers to block 42 in FIG. 5A. Block 42 in FIG. 5A is a delay element have a delay of D symbols. To further define the "upper bound" of the short correlation component, claim 57 recites "wherein the long correlation time component exhibits high correlation beyond the upper bound." In col. 5, lines 38-42, *Ghosh* states that "[t]his delay is chosen sufficiently large so as to decorrelate the broadband component of  $r_k$  which is  $a_k + n_k$ ." *Ghosh* further specifies the following:

As long as the delay D is chosen of sufficient length to decorrelate the broad band noise, the actual NTSC signal transmitted on the co-channel is not needed. The NTSC component, because of the periodic nature of its carriers, will remain correlated. The predictable NTSC component is removed from the received signal leaving only the unpredictable component  $a_k + n_k$  at the output.

(Emphasis added; col. 5, lines 48-55). As seen in the text above, *Ghosh* actually teaches that the predictable (NTSC) component is removed from the received signal to leave the unpredictable component at the output. In this regard, Applicants respectfully submit that that the delay introduced by *Ghosh* to decorrelate the broadband component does not appear to correspond to delaying the input signal based on an upper bound of the short correlation time component, whereby the long correlation time component exhibits high correlation beyond the upper bound. Furthermore, *Long* fails to address this deficiency in the *Ghosh* reference.

Accordingly, Applicants respectfully submit that independent claim 57 patently defines over *Ghosh* in view of *Long* for at least the reason that *Ghosh* in view of *Long*

fails to disclose, teach, or suggest the highlighted features in claim 29 above.

**D. Claims 10-12 and 38-40**

Claims 10-12 and 38-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Ghosh* in view of *Long* in further view of *Bergmans*. As set forth above, Applicants submit that independent claim 1 (from which claims 10-12 depend) and claim 29 (from which claims 38-40 depend) are patentable over *Ghosh* in view of *Long*. Furthermore, *Bergmans* fails to address the deficiencies expressed above for *Ghosh* in view of *Long*. As such, Applicants submit that independent claims 1 and 29 are patentable over the combination of *Ghosh* in view of *Long* in further view of *Bergmans*. Accordingly, dependent claims 10-12 and 38-40 are allowable for at least the reason that these claims depend from an allowable independent claim.

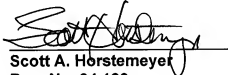


**CONCLUSION**

Applicants respectfully submit that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,

  
**Scott A. Horstemeyer**  
**Reg. No. 34,183**

**THOMAS, KAYDEN, HORSTEMEYER  
& RISLEY, L.L.P.**  
600 Galleria Parkway SE  
Suite 1500  
Atlanta, Georgia 30339  
(770) 933-9500